

Proposal For A New Non-General Education Course:

Introduction to Information Visualization

1. Details

- a. **Course Title:** Introduction to Information Visualization
- b. **Sponsor:** Adrian Rusu, Computer Science Department, Rowan University.
- c. **Semester hours:** 3
- d. **Course Level:** Undergraduate, [Junior/Senior]. General Education designation is not sought.
- e. **Prerequisites:** Linear Algebra (1701.210) or Math for Engineering Analysis II (1701.236).
- f. **Suggested Time and Scale of Implementation:** This course is to be offered every other year, or based on demand.

2. Curricular Effect

The proposed course will become available as “restricted elective” for computer science majors and minors. An Information Visualization course will increase the number and variety of those electives making Computer Science curriculum more attractive to prospective and current students. This course will examine the expanding field of Information Visualization, exposing students to existing and developing information visualization algorithms and techniques.

- **Offerings:** No class will be dropped as a result of this course.
- **Adequacy of Resources:** The current computers & software available in the open labs and computer science advanced lab are adequate to carry out this course at the present time. However it is fully expected that the equipment will need to be regularly upgraded to support this course, as well as all of the courses in our major. Thus it is, of course, necessary that a reasonable replacement cycle be maintained.
- **Recommended Library Resources:** Current library resources are adequate.
- **Short-term Evaluation:** This course has not been offered previously.

3. Rationale

A large component of human perception of the world is through sight. There is simply more bandwidth and processing power for input through the human eyes than through any other sensory modality. By contrast to its related, and much more mature discipline of scientific visualization, which deals primarily with three-dimensional physical objects and processes, such as blood flowing through heart valves, tornado

formation, crystal growth, protein structures, or oil reservoir shapes, the relative young field of information visualization is concerned with abstract phenomena for which there may not be a natural physical reality, such as stock market movements, social relationships, gene expression levels, manufacturing production monitoring, survey data from political polls, or supermarket purchases. The users of information visualization tools are interested in finding relationships among variables, discovering similar items, and identifying patterns such as clusters, outliers, and gaps. The expansion of the market and the application areas of information visualization are predicted to have an explosive growth for many years to come, as more and more data is being generated and needs to be understood. Well-qualified professionals in this area are, and will, in the foreseeable future, continue to be in great demand internationally and command substantial rewards.

The proposed course will strengthen the department's current offering of advanced restricted electives. Currently, computer science department offers one related course: 0707.360 Computer Graphics. An Information Visualization course is related to Computer Graphics because it often uses graphics to represent information.

4. Essence of the Course

a. **Objectives in Relation to Student Outcomes:** Upon completion of this course, students will be able to:

- understand the basics of information visualization principles
- implement information visualization techniques and algorithms using a graphics programming language
- be able to apply techniques to visualize 1-dimensional, 2-dimensional, and N-dimensional information
- be able to apply techniques and algorithms to browse and visualize image and digital libraries, as well as the World Wide Web
- understand how to model information in the form of graphs, and then how to apply graph visualization techniques
- implement and document a large software project related to information visualization

b. **Topical Outline/Content:**

- Introduction to Graphics Programming
- Information Visualization Principles
- Capabilities of Human Beings
- Human Perception of Color
- User-Centered Website Development
- Dynamic Queries
- Browsing and Visualization of Image Libraries
- Zoomable User Interfaces
- Browsing and Visualization of Digital Libraries

- Browsing and Visualization of the World Wide Web
- Understanding Hierarchical Data
- Graph Visualization

c. Evaluation of students and grading procedure: Students will be evaluated by traditional methods such as homework and projects assignments, quizzes, presentations, and exams.

d. Course Evaluation: This course will be evaluated through student surveys, as well as by the Computer Science Accreditation Commission when our major is to be re-evaluated in 2006.

5. Consultations

- a. Management & M.I.S.
- b. Electrical & Computer Engineering
- c. Mathematics
- d. Psychology

6. Catalog Description

0707.370 (Suggested hegis number)

3 s.h.

Introduction to Information Visualization

(Prerequisite: 1701.210 or 1701.236)

This is a junior/senior level course that introduces basic elements of Information Visualization. Topics covered include graphics programming, information visualization general principles, visualization techniques for 1-dimensional, 2-dimensional, and N-dimensional information, graph visualization, visualization techniques for image and digital libraries, as well as for the World Wide Web, interactivity, and focus+context techniques. This course includes the implementation of techniques presented in lecture. Students are encouraged to devise new techniques, implement them, and determine their effectiveness. Students will be required to implement and document a large software project related to information visualization.